WASHOE COUNTY
HEALTH DISTRICT
ENHANCING QUALITY OF LIFE

2011-20 Washoe County, Nevada Air Quality Trends Report

July 1, 2021

Public Health
Prevent. Promote. Protect.

VISION

A healthy community

MISSION

To protect and enhance the well-being and quality of life for all in Washoe County.

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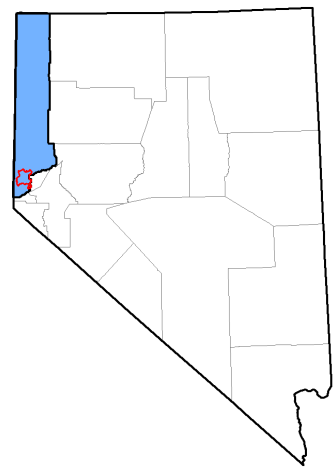
Acronyms and Abbreviations

AQI	Air Quality Index
AQMD	Washoe County Health District - Air Quality Management Division
AQS	Air Quality System
BAM	Beta Attenuation Monitor
CFR	Code of Federal Regulations
CBSA	Core-Based Statistical Area
CO	Carbon Monoxide
EPA	U.S. Environmental Protection Agency
GAL	Galletti
HA 87	Hydrographic Area 87
HC	Hydrocarbons
HNO_2	Nitrous Acid
HNO_3	Nitric Acid
INC	Incline
LEM	Lemmon Valley
$\mu g/m^3$	Micrograms per cubic meter
NAAQS	National Ambient Air Quality Standards
NCore	National Core Multi-Pollutant Monitoring Station
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NO_y	Reactive Oxides of Nitrogen
O_3	Ozone
PLM	Plumb-Kit
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter less than or equal to 2.5 microns in aerodynamic diameter
PM_{10}	Particulate Matter less than or equal to 10 microns in aerodynamic diameter
PM_{coarse}	PM_{10} minus $PM_{2.5}$
ppb	Parts per billion
ppm	Parts per million
REN	Reno4
RNO	Reno3
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station
SO_2	Sulfur Dioxide
SO_3	Sulfur Trioxide
SO_x	Oxides of Sulfur
SPK	Sparks
SPM	Special Purpose Monitoring
SPS	Spanish Springs
SRN	South Reno
STN	Speciation Trends Network
TOL	Toll
USG	Unhealthy for Sensitive Groups
VOC	Volatile Organic Compounds

Introduction

Washoe County is in the northwest portion of Nevada and bounded by California, Oregon, and the Nevada counties of Humboldt, Pershing, Storey, Churchill, Lyon, and Carson City (Figure 1). The Truckee Meadows is approximately 200 square miles in size and situated in the southern portion of Washoe County. It is geographically identified as Hydrographic Area 87 (HA 87) as defined by the State of Nevada Division of Water Resources. Most of Washoe County's urban population lives in the Truckee Meadows. Anthropogenic activities, such as automobile use and residential wood combustion, are also concentrated here.

Figure 1
Washoe County, Nevada



The U.S. Environmental Protection Agency (EPA) has set health and welfare based National Ambient Air Quality Standards (NAAQS) for the following pollutants: ozone (O_3), particulate matter less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$), particulate matter less than or equal to 10 microns in aerodynamic diameter (PM_{10}), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb).

The mission of the Washoe County Health District, Air Quality Management Division (AQMD) Monitoring Program is "To monitor and assure the scientific accuracy of the ambient air quality data collected for the determination of compliance with the National Ambient Air Quality Standards (NAAQS) as defined by the EPA". The AQMD has established a monitoring network throughout the Health District to collect ambient air data. The network is reviewed annually to ensure it reflects the actual air quality of the county and that it is measuring for the pollutants of highest concern.

This document summarizes the ambient air data collected between 2011 and 2020 from the AQMD's monitoring network. These data were submitted to the EPA's Air Quality System (AQS) and are available for public review on EPA's AirData website. Long-term monitoring data can reveal trends in ambient air pollution and the subsequent need for control strategies.

Pollutants

The following describes the six NAAQS criteria pollutants, their primary sources, and associated health effects.

Ozone (O_3)

Ozone is a gas composed of three oxygen atoms. It is not usually emitted directly into the air, but, at ground-level, it is created by a chemical reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Ozone has the same chemical structure whether it occurs miles above the earth or at ground-level and can be "good" or "bad", depending on its location in the atmosphere. "Good" O_3 occurs naturally in the stratosphere approximately 10 to 30 miles above the earth and forms a layer that protects life on earth from the sun's harmful rays.

In the lower atmosphere, ground-level O_3 is considered "bad". Breathing ground-level O_3 can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground-level O_3 can also reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. People with lung disease, children, older adults, and physically active people may be affected when O_3 levels are unhealthy. Numerous scientific studies have linked ground-level O_3 exposure to a variety of problems including airway irritation, coughing, and pain when taking a deep breath; wheezing and breathing difficulties during exercise or outdoor activities; inflammation, which is much like a sunburn on the skin; aggravation of asthma and increased susceptibility to respiratory illnesses like pneumonia and bronchitis; and permanent lung damage with repeated exposures.

Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents as well as natural sources emit NO_x and VOC that help form O_3. Ground-level O_3 is the primary constituent of smog. Sunlight and hot weather cause ground-level O_3 to form in harmful concentrations. As a result, it is known as a summertime air pollutant. Many urban areas tend to have high levels of "bad" O_3, but even rural areas are also subject to increased O_3 levels because wind carries O_3 and pollutants that form it hundreds of miles away from their original sources.

Particulate Matter (PM_{10}, $PM_{2.5}$, and PM_{coarse})

Particulate matter, also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of several components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles.

The size of particles is directly linked to their potential for causing health problems. Of concern are particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. EPA groups particle pollution into two categories:

- "Inhalable coarse particles" (PM_{10} and PM_{coarse}), such as those found near roadways and dusty industries, are between 2.5 and 10 micrometers in diameter.
- "Fine particles" ($PM_{2.5}$), such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries, and automobiles react in the air.

Particle pollution, especially fine particles, contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including irritation of the airways, coughing, difficulty breathing, decreased lung function, aggravated asthma, development of chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease.

People with heart or lung diseases, children and older adults are the most likely to be affected by particle pollution exposure. However, even healthy people may experience temporary symptoms from exposure to elevated levels of particle pollution.

Carbon Monoxide (CO)

Carbon monoxide is a colorless, odorless gas that is formed when carbon in fuel is not burned completely. It is a byproduct of incomplete combustion found in exhaust of on-road vehicles, non-road engines and vehicles (such as construction equipment and boats) and in industrial processes, residential wood burning, and natural sources such as wildfires. Higher concentrations generally occur in areas with heavy traffic congestion. Typically, the highest ambient levels of CO typically occur during the colder months of the year when temperature inversions are more frequent. The air pollution becomes trapped near the ground beneath a layer of warm air.

Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs (i.e., heart and brain) and tissues. The health threat from lower levels of CO is most serious for those who suffer from heart disease, like angina, clogged arteries, or congestive heart failure. For a person with heart disease, a single exposure to low levels of CO may cause chest pain and a reduced ability to exercise. Repeated exposures may contribute to other cardiovascular effects. Even healthy people can be affected by high levels of CO. Exposure to high levels can result in vision problems, reduced ability to work or learn, reduced manual dexterity, and difficulty performing complex tasks. At extremely high levels, CO is poisonous and can cause death.

Nitrogen Dioxide (NO_2)

Nitrogen dioxide is one of a group of highly reactive gasses known as "oxides of nitrogen", or "nitrogen oxides (NO_x)". Other nitrogen oxides include nitrous acid (HNO_2) and nitric acid (HNO_3). While EPA's NAAQS covers this entire group of NO_x, NO_2 is the component of greatest interest and the indicator for the larger group of NO_x. Nitrogen dioxide forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level O_3 and fine particle pollution, NO_2 is linked with several adverse effects on the respiratory system.

Current scientific evidence links short-term NO_2 exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between breathing elevated short-term NO_2 concentrations, and increased visits to emergency rooms and hospital admissions for respiratory issues, especially asthma.

NO_2 concentrations in vehicles and near roadways are appreciably higher than those measured at monitors in the current network. In fact, in-vehicle concentrations can be 2 to 3 times higher than measured at nearby area-wide monitors. Near-roadway (within about 50 meters) concentrations of NO_2 have been measured to be approximately 30 to 100% higher than concentrations away from roadways.

Individuals who spend time on or near major roadways can experience short-term NO_2 exposures considerably higher than measured by the current network. Approximately 16% of US housing units (approximately 48 million people) are located within 300 feet of a major highway, railroad, or airport. NO_2 exposure concentrations near roadways are of particular concern for susceptible individuals, including people with asthma, children, and the elderly.

NO_x reacts with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. Ozone is formed when NO_x and VOC react in the presence of heat and sunlight. Children, the elderly, people with lung diseases such as asthma, and people who work or exercise outdoors are at risk for adverse effects from O_3. These include reduction in lung function and increased respiratory symptoms as well as respiratory-related emergency room visits, hospital admissions, and possibly premature deaths.

Emissions that lead to the formation of NO_2 generally also lead to the formation of other NO_x. Emissions control measures leading to reductions in NO_2 can generally be expected to reduce population exposures to all gaseous NO_x. This may have the important co-benefit of reducing the formation of O_3 and fine particles, both of which pose significant public health threats.

Sulfur Dioxide (SO_2)

Sulfur dioxide is one of a group of highly reactive gasses known as "oxides of sulfur". The largest sources of SO_2 emissions are from fossil fuel combustion at power plants (66%) and other industrial facilities (29%). Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore, and the burning of high sulfur-containing fuels by locomotives, large ships, and non-road equipment. SO_2 is linked with a number of adverse effects on the respiratory system.

Current scientific evidence links short-term exposures to SO_2, ranging from 5 minutes to 24 hours, with an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. These effects are particularly important for asthmatics at elevated ventilation rates (i.e., while exercising or playing.). Studies also show a connection between short-term exposure and increased visits to emergency rooms and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.

EPA's SO_2 NAAQS is designed to protect against exposure to the entire group of sulfur oxides (SO_x). SO_2 is the component of greatest concern and is used as the indicator for the larger group of SO_x. Other gaseous sulfur oxides (i.e., sulfur trioxide (SO_3)) are found in the atmosphere at concentrations much lower than SO_2.

Emissions leading to high concentrations of SO_2 generally also lead to the formation of other SO_x. Control measures that reduce SO_2 can generally be expected to reduce people's exposures to all gaseous SO_x. This may have the important co-benefit of reducing the formation of fine sulfate particles, which pose significant public health threats.

SO_x can react with other compounds in the atmosphere to form small particles. These particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. EPA's PM NAAQS are designed to provide protection against these health effects.

Lead (Pb)

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of Pb emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. As a result of EPA's efforts to remove Pb from gasoline, ambient Pb levels decreased 99% between 1980 and 2017. Today, elevated levels of Pb in air are usually found near lead smelters, waste incinerators, utilities, lead-acid battery manufacturers, and can be found in emissions of non-road mobile sources such as piston-propelled aircraft.

In addition to exposure to Pb in air, other major exposure pathways include ingestion of Pb in drinking water and lead-contaminated food as well as incidental ingestion of lead-contaminated soil and dust. Lead-based paint remains a major exposure pathway in older homes.

Once taken into the body, Pb distributes throughout the body in the blood and is accumulated in the bones. Depending on the level of exposure, Pb can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems, and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. The effects most encountered in current populations are neurological effects in children and cardiovascular effects (i.e., high blood pressure and heart disease) in adults. Infants and young children are especially sensitive to even low levels of Pb, which may contribute to behavioral problems, learning deficits, and lowered IQ.

National Ambient Air Quality Standards

The Clean Air Act requires the EPA to establish NAAQS for pollutants considered harmful to public health and the environment. Two types of NAAQS have been established: primary and secondary standards. Primary standards set limits to protect public health, especially that of sensitive populations such as asthmatics, children, and seniors. Secondary standards set limits to protect public welfare, including protections against decreased visibility, damage to animals, crops, and buildings.

The EPA has set NAAQS for seven principal pollutants, which are called "criteria" pollutants. They are listed in Title 40 of the Code of Federal Regulations (CFR) Part 50 and summarized in Table 1 below. The units of measure for the standards are parts per million (ppm), part per billion (ppb), or micrograms per cubic meter of air ($\mu g/m^3$).

Table 1
National Ambient Air Quality Standards (as of December 31, 2020)

Pollutant	Primary Standard		Secondary Standard		Form
	Averaging Time	Level	Averaging Time	Level	
O_3	8-hour	0.070 ppm	Same as primary		Fourth highest daily maximum concentration, averaged over 3 years
$PM_{2.5}$	24-hour	35 $\mu g/m^3$	Same as primary		98th percentile of daily max, averaged over 3 years
	Annual	12.0 $\mu g/m^3$	Annual	15.0 $\mu g/m^3$	Annual mean, averaged over 3 years
PM_{10}	24-hour	150 $\mu g/m^3$	Same as primary		Not to be exceeded more than once per year on average over 3 years
CO	1-hour	35 ppm	None		Not to be exceeded more than once per year
	8-hour	9 ppm	None		
NO_2	1-hour	100 ppb	None		98th percentile, averaged over 3 years
	Annual	53 ppb	Same as primary		Annual Mean
SO_2	1-hour	75 ppb	3-hour	0.5 ppm	1°: 99th percentile of daily maximum concentration, averaged over 3 years 2°: not to be exceeded more than once per year
Pb	Rolling 3-month average	0.15 $\mu g/m^3$	Same as primary		Not to be exceeded

Current Design Values and Attainment Status

Table 2 summarizes Washoe County's current design values. Design values are the statistic used to compare ambient air monitoring data against the NAAQS to determine designations for each NAAQS. Designations are also codified in 40 CFR 81.329.

Table 2
Design Values and Attainment Status (as of December 31, 2020)

NAAQS			Designations	
Pollutant (Averaging Time)	Level	Design Value	Unclassifiable/ Attainment, or Maintenance	Non-Attainment (classification)
O_3 (8-hour)	0.070 ppm	0.072 ppm	All HA's	---
$PM_{2.5}$ (24-hour)	35 µg/m^3	39 µg/m^3	All HA's	---
$PM_{2.5}$ (Annual)	12.0 µg/m^3	8.3 µg/m^3	All HA's	---
PM_{10} (24-hour)	150 µg/m^3	1.7 Expected Exceedances	All HA's[1]	---
CO (1-hour)	35 ppm	2.4 ppm	All HA's	---
CO (8-hour)	9 ppm	1.8 ppm	All HA's[2]	---
NO_2 (1-hour)	100 ppb	n/a*	All HA's	---
NO_2 (Annual Mean)	53 ppb	12 ppb	All HA's	---
SO_2 (1-hour)	75 ppb	n/a*	All HA's	---
Pb (Rolling 3-month average)	0.15 µg/m^3	n/a	All HA's	---

[1] Maintenance Area for PM_{10} (1st 10-year maintenance plan expires January 6, 2026) 80 FR 76232
[2] Maintenance Area for CO (2nd 10 year maintenance plan expires October 31, 2026) 81 FR 59490
*Less than three years of data.

Ambient Air Monitoring Network

The AQMD began monitoring ambient air quality in Washoe County in the 1960's, and the monitoring network has grown and evolved since that time. This trends report provides a summary of data collected from ambient air monitoring sites in Washoe County that the AQMD operated and maintained between 2011 and 2020 to measure O_3, $PM_{2.5}$, PM_{10}, CO, NO_2, and SO_2. Due to the Reno, NV Core-Based Statistical Area (CBSA) population being under 500,000 as required by 40 CFR 58, Appendix D, Section 3(b) and not exceeding airport and non-airport emissions limits in 40 CFR 58, Appendix D, Section 4.5(a), there is no Pb monitoring in Washoe County.

Each monitoring site is classified into one of two major categories - SLAMS (State and Local Air Monitoring Station) and SPM (Special Purpose Monitoring). SLAMS consist of a network of monitoring stations, the size and distribution of which is largely determined by the monitoring requirements for NAAQS comparison. SLAMS in the AQMD's network can be further classified as NCore (National Core monitoring network) or STN (Speciation Trends Network).

The AQMD's monitoring stations are sited in accordance with 40 CFR 58 and utilize equipment designated as reference or equivalent methods.[1] In addition, the network is reviewed annually[2] to ensure it meets the monitoring objectives defined in 40 CFR 58, Appendix D. Ambient air monitoring data are collected, quality assured,[3] and recorded in AQS. Appendix A of this document provides a detailed summary of the ambient air monitoring data for 2020. All data summarized in Appendix A has been provided by reports retrieved from AQS. The data provided by AQS reports were certified on April 27, 2021 as "complete to the best of our knowledge and ability". Figure 2 displays the ambient air monitoring sites operated between 2011 and 2020. For specific details regarding the ambient air monitoring network, refer to the AQMD's "2020 Ambient Air Monitoring Network Plan" and "2020 Ambient Air Monitoring Network Assessment".

[1] 40 CFR 53.
[2] 40 CFR 58.10.
[3] 40 CFR 58.

Figure 2
Washoe County Ambient Air Monitoring Sites (2011-2020)

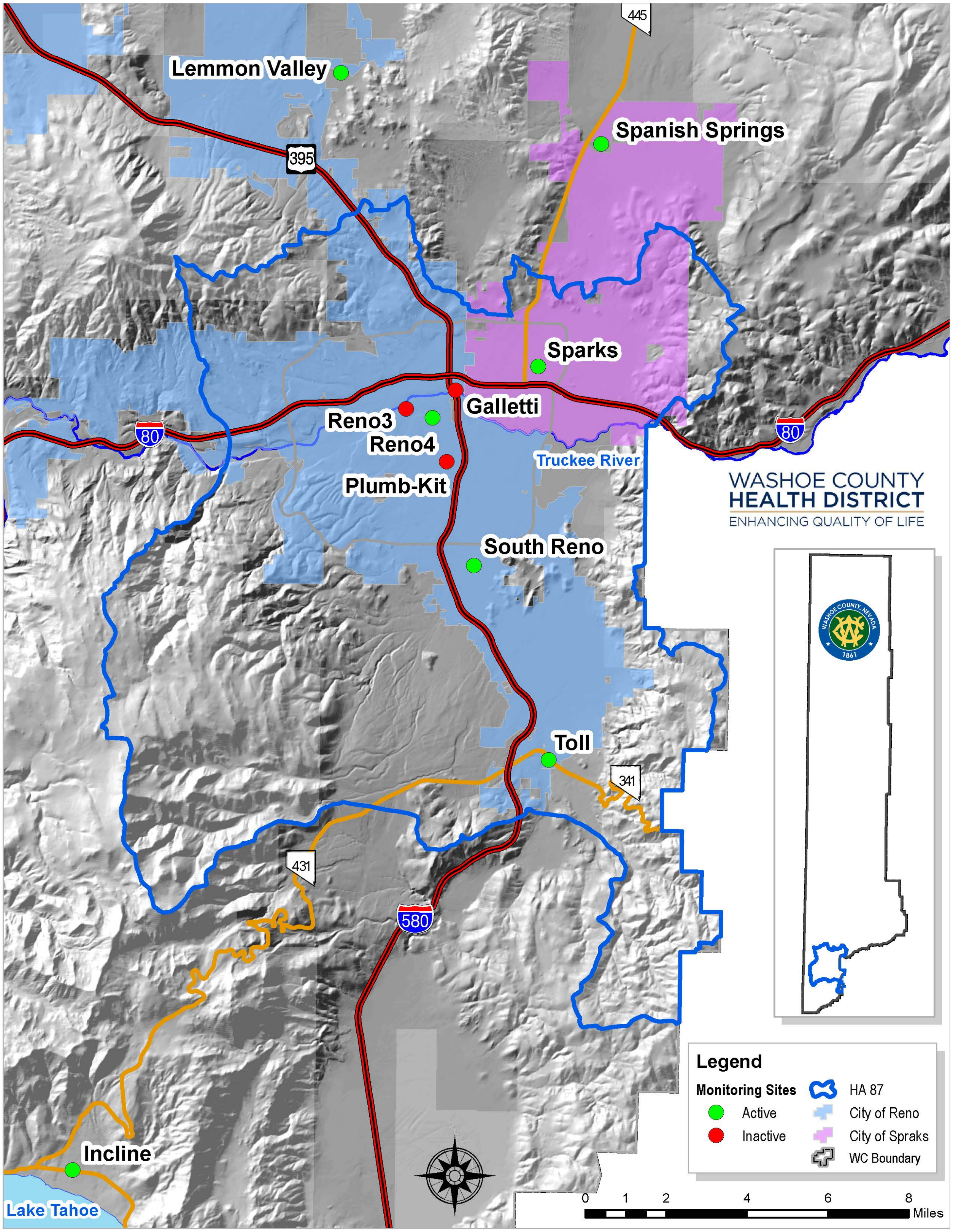


Table 3 Monitoring Stations in Operation and Pollutants Monitored in 2020

Network Type Site SLAMS	O_3	CO	Trace CO	Trace NO	NO_2	NO_x	Trace NOy	Trace SO_2	PM_{10} (manual)	PM_{10} (continuous)	$PM_{2.5}$ (manual)	$PM_{2.5}$ (continuous)	PM_{coarse} (manual)	PM_{coarse} (continuous)	$PM_{2.5}$ Speciation	Meteorology
Incline	✓															
Lemmon Valley	✓															
South Reno	✓															✓
Spanish Springs	✓									✓		✓		✓		✓
Sparks	✓	✓								✓		✓		✓		
Toll	✓									✓		✓		✓		✓
NCore																
Reno4	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Speciation Trends																
Reno4															✓	

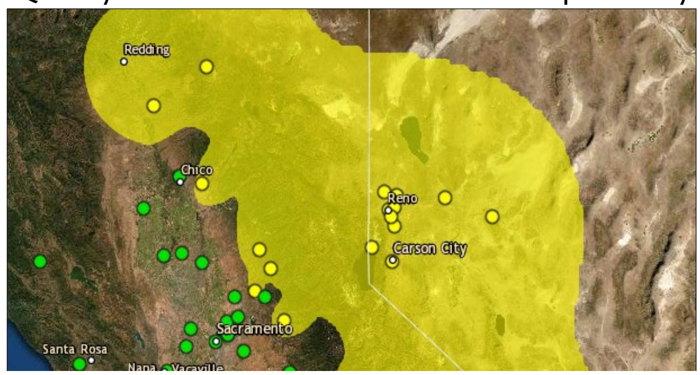
Monitoring Stations in Operation and Pollutants Monitored Prior to 2020

Ambient air monitoring data have been collected in Washoe County since the 1963. A complete historical list of monitoring stations and pollutants monitored is included in Appendix B.

A Review of 2020

January and February continued the green burn code streak. The 2019-20 burn code season ended with 121 green burn codes. This is the second season in the 33-year history of the wood stove program in which we only issued green burn codes. January and February had a four-week dry spell. The highest 24-hour average for $PM_{2.5}$ during the burn code season was 15.4 µg/m^3 on January 23 at Sparks.

Figure 3
Air Quality Index Monitor and Contour Map on May 10



March and April saw increased precipitation in the region. However, it was not enough to bring the cumulative daily precipitation back to the average for the Northern Sierras. Record heat and thunderstorms started in May. A springtime, interstate transport ozone event was observed on May 10 with unusually high ozone concentrations across Northern Nevada including the highest springtime 8-hour average for ozone of 0.070 ppm on May 10 at Incline.

Thunderstorms arrived by the end of June and lasted until the beginning of September. The first wildfire to impact Washoe County was the Hog Fire on July 20. A series of thunderstorms in August and September started a record wildfire season that lasted into October. Nearly 4.4 million acres burned in California. The top four days all-time in Washoe County for $PM_{2.5}$ occurred September 11-15 at Spanish Springs mainly due to the North Complex Fire. The highest 24-hour averages for $PM_{2.5}$ and PM_{10} during the summer was 189.7 and 238 µg/m^3, respectively on September 13 at Spanish Springs. This was the highest PM_{10} 24-hour average ever monitored dating back to 1988. Elevated ozone caused by wildfire smoke occurred throughout this period. The highest 8-hour average of 0.085 ppm happened on September 15 at Incline. This was the highest 8-hour average since the 2008 wildfire season.

Figure 4
Satellite Image of Wildfire Smoke on September 10

From October to December, conditions were favorable for prescribed fires. Two periods of cold air inversions caused elevated $PM_{2.5}$. The highest 24-hour average for $PM_{2.5}$ for the fall and winter was 26.0 µg/m^3 on December 20 at Sparks. The green burn code streak from the previous season continued through the end of the year. 2020 was the 2nd driest and 7th warmest year for Reno on record.

Table 4 summarizes NAAQS exceedances in 2020 by pollutant, averaging period, and dates.

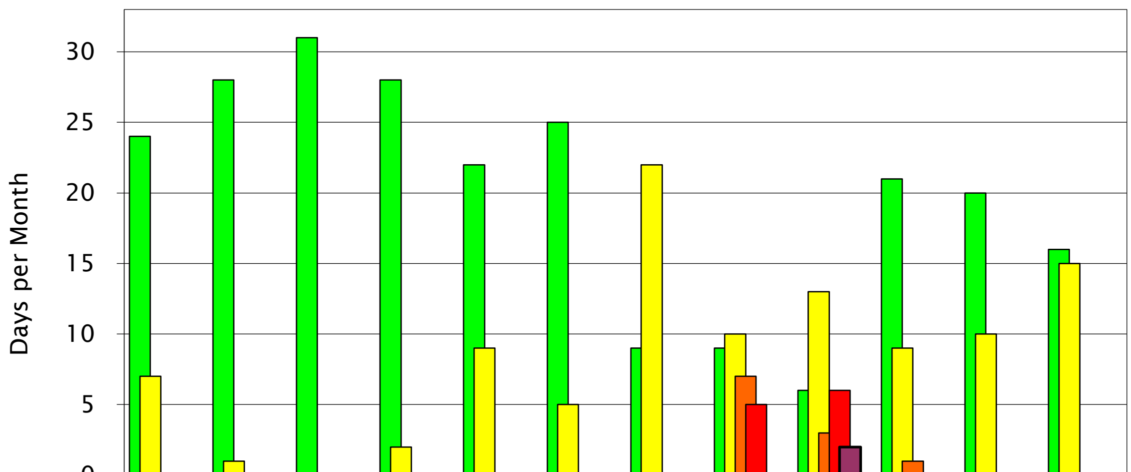
Table 4
2020 NAAQS Exceedances Summary

Pollutant	Averaging Period	Exceedance Dates
O_3	8-hour	Aug 20-25, 30; Sep 14-17
$PM_{2.5}$	24-hour	Aug 16, 19-23, 25, 27-30; Sep 3, 7, 11-17, 30; Oct 1
PM_{10}	24-hour	Sep 8, 11-13, 15-16
CO	1-hour	None
	8-hour	None
NO_2	1-hour	None
SO_2	1-hour	None
	3-hour	None
Pb	Rolling 3-month	Not required to monitor based on population size and lack of significant Pb sources.

2020 Air Quality Index Summaries

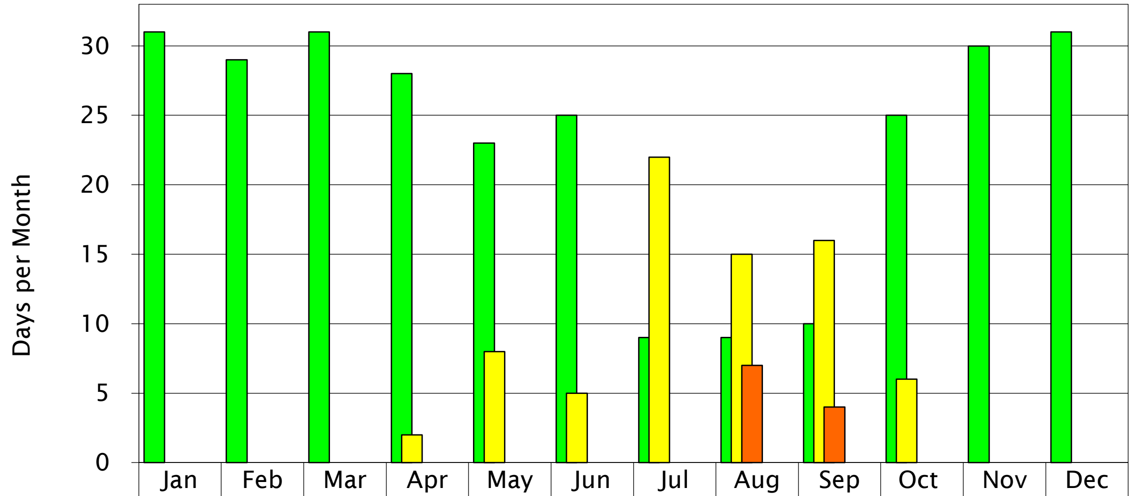
The Air Quality Index (AQI) is an index for reporting daily air quality that has been established by the EPA. It informs the public how clean or polluted the air is, and what associated health effects might be a concern. The AQI is reported to the public via EnviroFlash, social media (Facebook and Twitter), AirNow.gov, and the AQMD's air quality hotline ((775) 785-4110). The email, social media, and hotline are updated daily, and more often during air pollution episodes. The next six figures are pollutant-specific and summarize Washoe County's air quality for the previous year by pollutant, month, and AQI categories. The highest NAAQS average pollutant throughout our network is the AQI for that day. Months with less AQIs than days for NO_2 and SO_2 are due to not meeting data completeness requirements for the AQI averaging time due to invalid data.

Figure 5
Monthly AQI Summary for All Pollutants (2020)



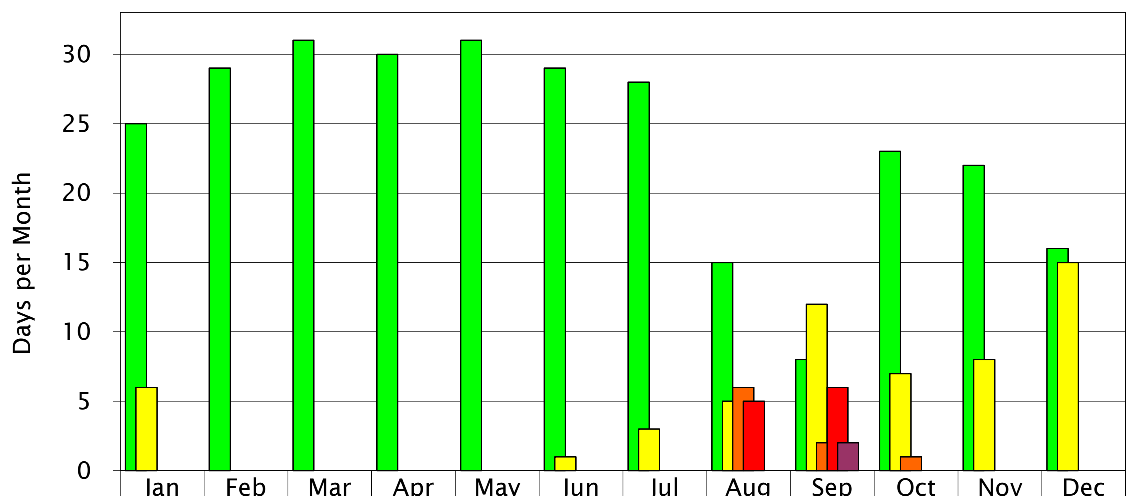
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	24	28	31	28	22	25	9	9	6	21	20	16
Moderate	7	1	-	2	9	5	22	10	13	9	10	15
USG	-	-	-	-	-	-	-	7	3	1	-	-
Unhealthy	-	-	-	-	-	-	-	5	6	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	2	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 6
Monthly AQI Summary of O_3 (2020)



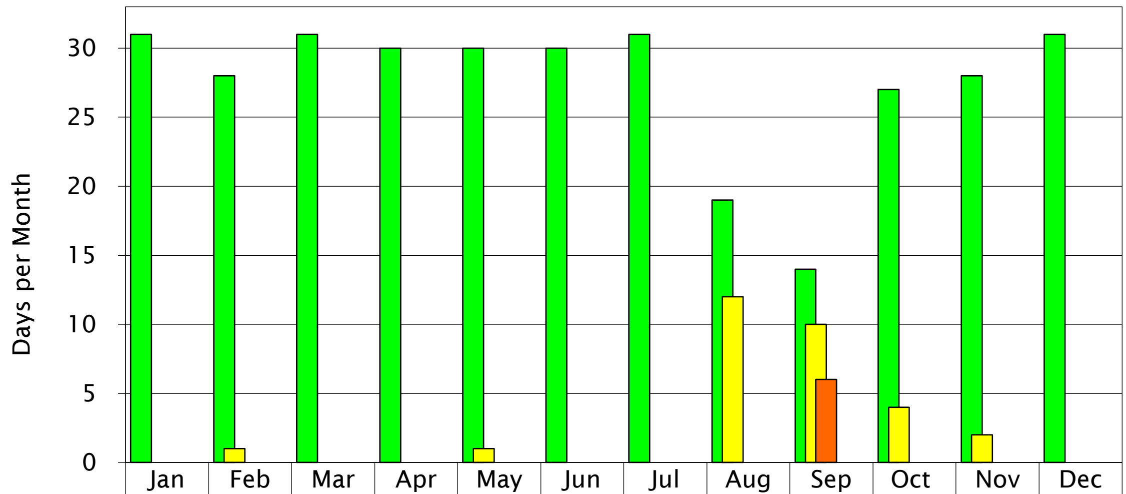
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	31	29	31	28	23	25	9	9	10	25	30	31
Moderate	-	-	-	2	8	5	22	15	16	6	-	-
USG	-	-	-	-	-	-	-	7	4	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 7
Monthly AQI Summary of $PM_{2.5}$ (2020)



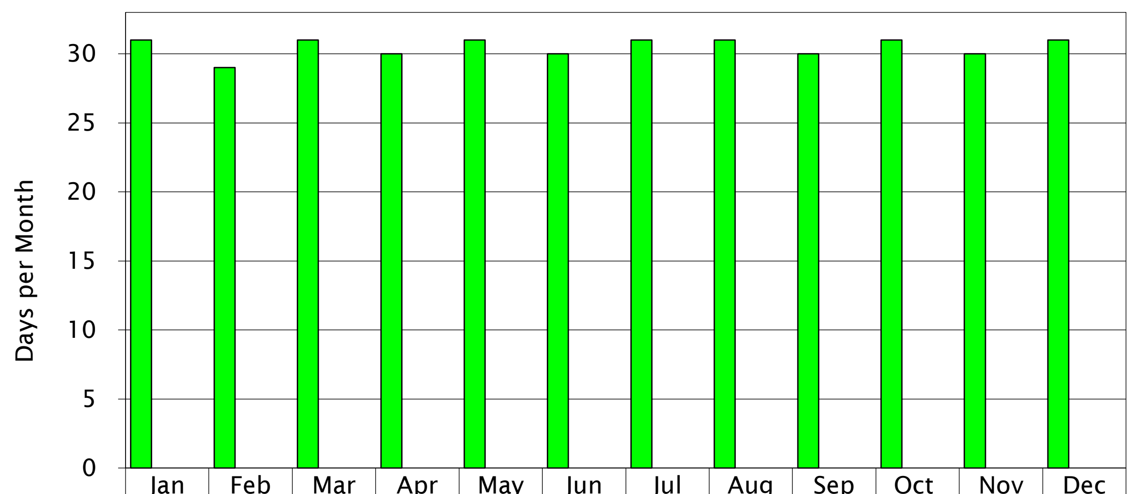
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	25	29	31	30	31	29	28	15	8	23	22	16
Moderate	6	-	-	-	-	1	3	5	12	7	8	15
USG	-	-	-	-	-	-	-	6	2	1	-	-
Unhealthy	-	-	-	-	-	-	-	5	6	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	2	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 8
Monthly AQI Summary of PM_{10} (2020)



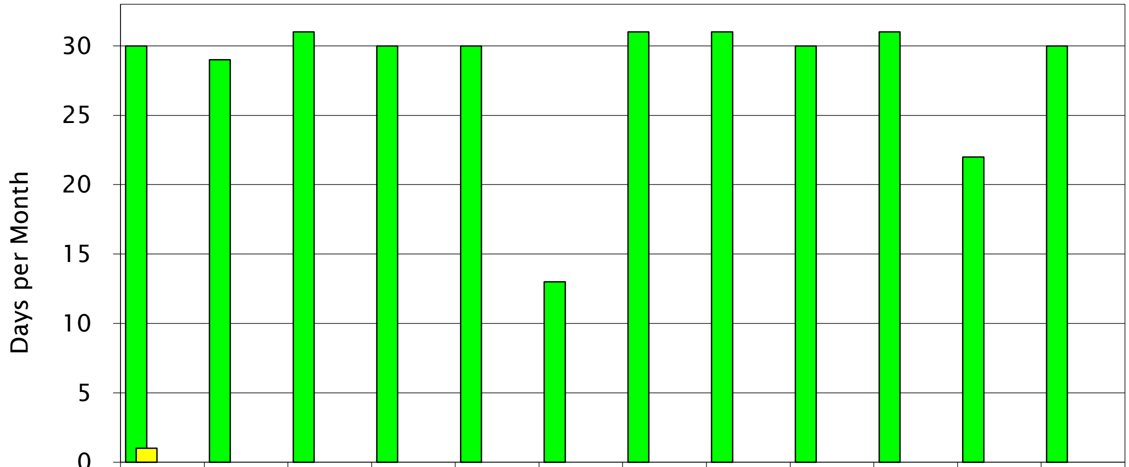
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	31	28	31	30	30	30	31	19	14	27	28	31
Moderate	-	1	-	-	1	-	-	12	10	4	2	-
USG	-	-	-	-	-	-	-	-	6	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 9
Monthly AQI Summary of CO (2020)



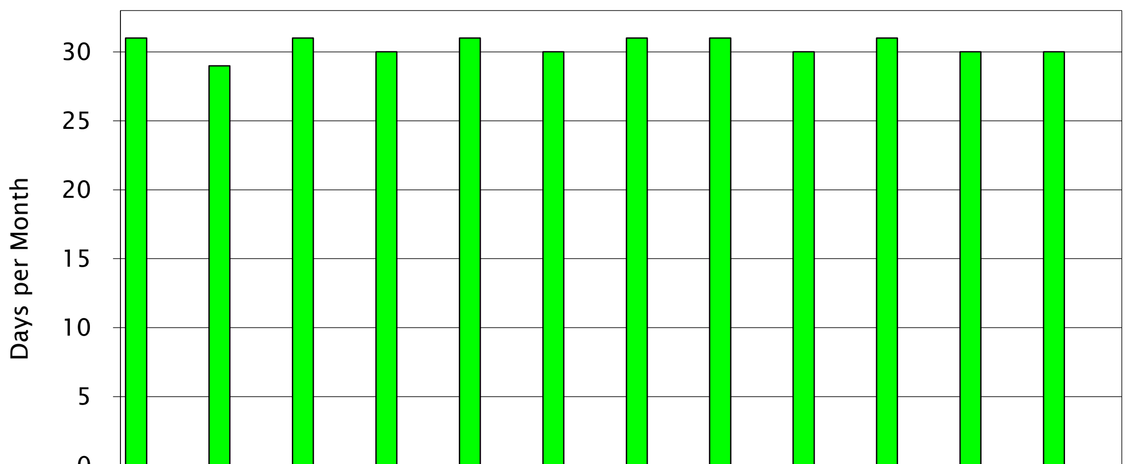
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	31	29	31	30	31	30	31	31	30	31	30	31
Moderate	-	-	-	-	-	-	-	-	-	-	-	-
USG	-	-	-	-	-	-	-	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 10
Monthly AQI Summary of NO_2 (2020)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	30	29	31	30	30	13	31	31	30	31	22	30
Moderate	1	-	-	-	-	-	-	-	-	-	-	-
USG	-	-	-	-	-	-	-	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 11
Monthly AQI Summary of SO_2 (2020)



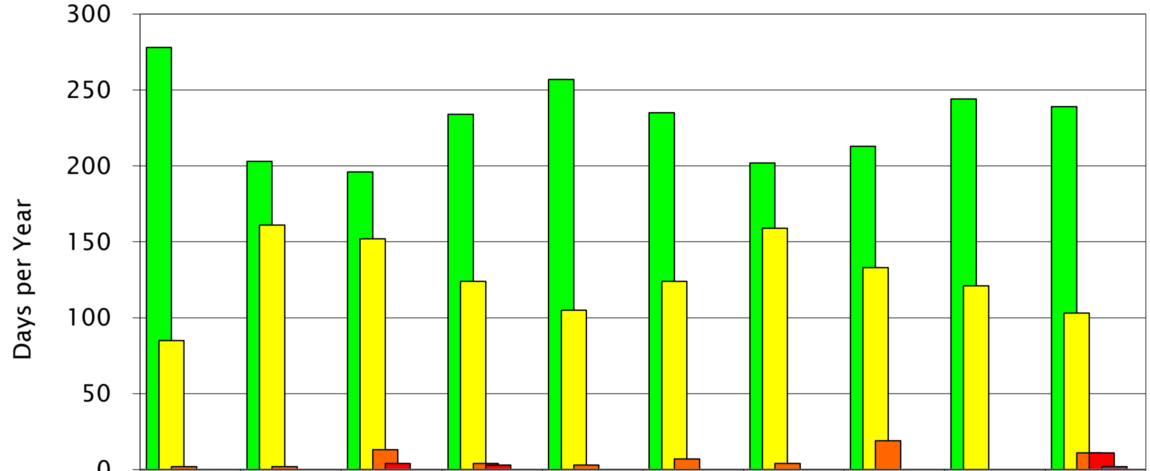
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	31	29	31	30	31	30	31	31	30	31	30	30
Moderate	-	-	-	-	-	-	-	-	-	-	-	-
USG	-	-	-	-	-	-	-	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Ten-Year Air Quality Trend

Air Quality Index

Figure 12 summarizes the ten-year trend in AQI between 2011 and 2020. NAAQS revisions in 2012 and 2015 resulted in changes to AQI category ranges and the number of days per year within those ranges.

Figure 12
AQI Trend (2011-2020)



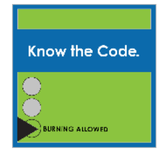
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Good	278	203	196	234	257	235	202	213	244	239
Moderate	85	161	152	124	105	124	159	133	121	103
USG*	2	2	13	4	3	7	4	19	-	11
Unhealthy	-	-	4	3	-	-	-	-	-	11
Very Unhealthy	-	-	-	-	-	-	-	-	-	2
Hazardous	-	-	-	-	-	-	-	-	-	-

* Unhealthy for Sensitive Groups

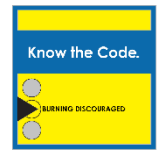
Notes
2012: Annual $PM_{2.5}$ NAAQS strengthened from 15.0 to 12.0 μg/m^3.
2015: 8-hour O_3 NAAQS strengthened from 0.075 to 0.070 ppm.

Burn Code Season

The Burn Code program has been in place since 1987. It begins November 1 and ends on the last day of February. During this wintertime period, the burn code curtails PM_{10}, $PM_{2.5}$, and CO emissions from residential and commercial solid fuel burning devices such as wood stoves, pellet stoves, fireplaces, and residential open burning.



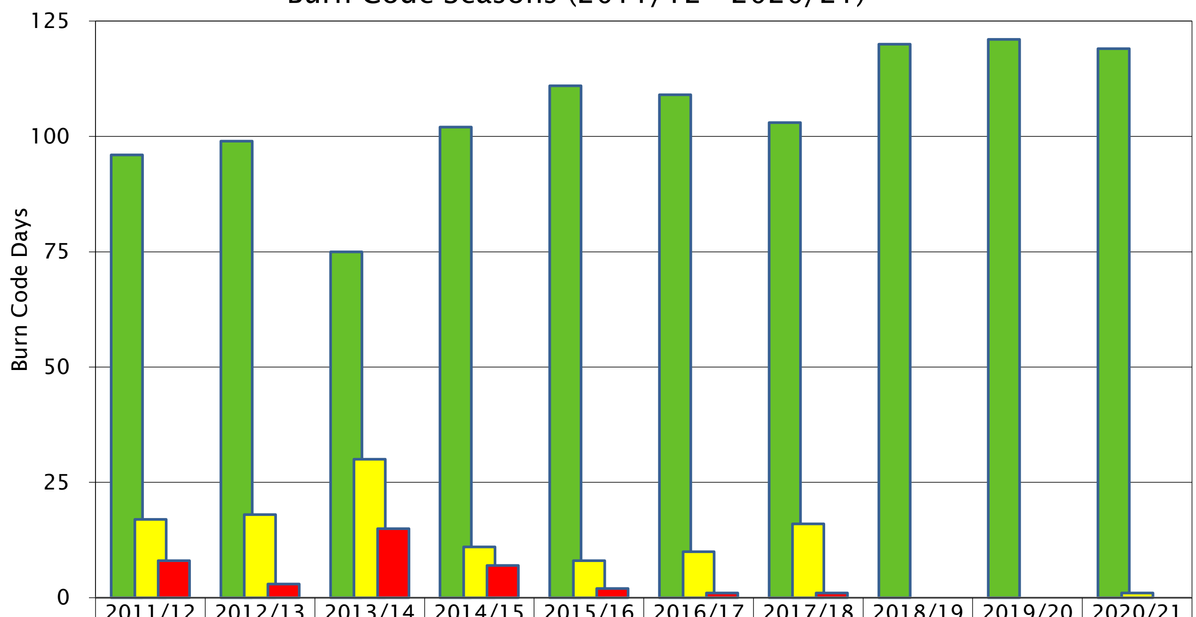
Green: Issued when $PM_{2.5}$ levels are low and are not expected to be approaching the 24-hour $PM_{2.5}$ NAAQS. It is legal for residents and businesses to use their solid fuel burning device.



Yellow: Issued when $PM_{2.5}$ levels are approaching the 24-hour $PM_{2.5}$ NAAQS. It is legal for residents and businesses to use their solid fuel burning device, but it is encouraged to reduce or stop burning.

Red: Issued when $PM_{2.5}$ levels are above or expected to be above the $PM_{2.5}$ NAAQS. It is illegal for residents to use their solid fuel burning device except residents that have a sole source exemption. It is also illegal for businesses to burn solid fuel at a 24-hour average of 55 µg/m^3 for $PM_{2.5}$.

Figure 13
Burn Code Seasons (2011/12 - 2020/21)



	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Green	96	99	75	102	111	109	103	120	121	119
Yellow	17	18	30	11	8	10	16	-	-	1
Red	8	3	15	7	2	1	1	-	-	-

Design Values

Data in the following section contains data that the AQMD has flagged as "exceptional" due to events such as wildfires and high winds. The design values will include these "exceptional" data until EPA determines concurrence with AQMD's exceptional events demonstrations submitted to EPA for Reno3 O_3 in 2008 and for Reno3 $PM_{2.5}$ in 2008, 2013, and 2014. Ozone exceptional events for the Reno3 monitoring station in 2015 and 2016 were concurred by EPA Region 9 on May 30, 2017.[4]

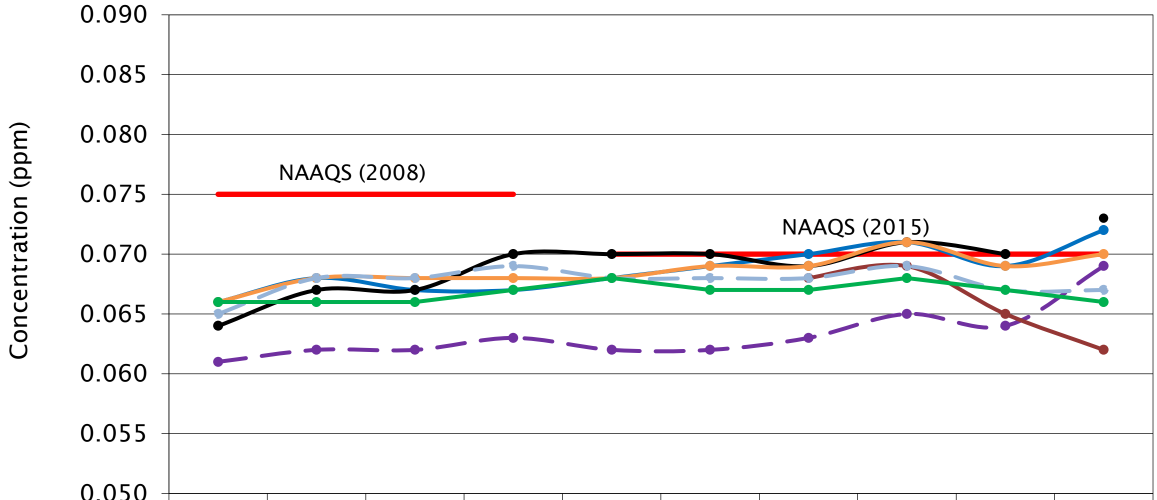
[4] "Exceptional Events Document Ozone - Washoe, NV." (**www.epa.gov/air-quality-analysis/exceptional-events-documents-ozone-washoe-nv**), EPA.gov. United States Environmental Protection Agency, 9 June 2017. Web. 20 May 2020

O_3 (8-hour) Design Values

<u>NAAQS Level</u>: 0.070 ppm
<u>Design Value (2018-20)</u>: 0.072 ppm (LEM)
<u>Current Designation</u>: Attainment/Unclassifiable (Entire County)

<u>2020 Exceedances</u>: 11
<u>2020 First High</u>: 0.085 ppm (Sep 15 - INC)
<u>2020 Fourth High</u>: 0.079 ppm (Sep 15 - LEM)

Figure 14
O_3 (8-hour) Design Values



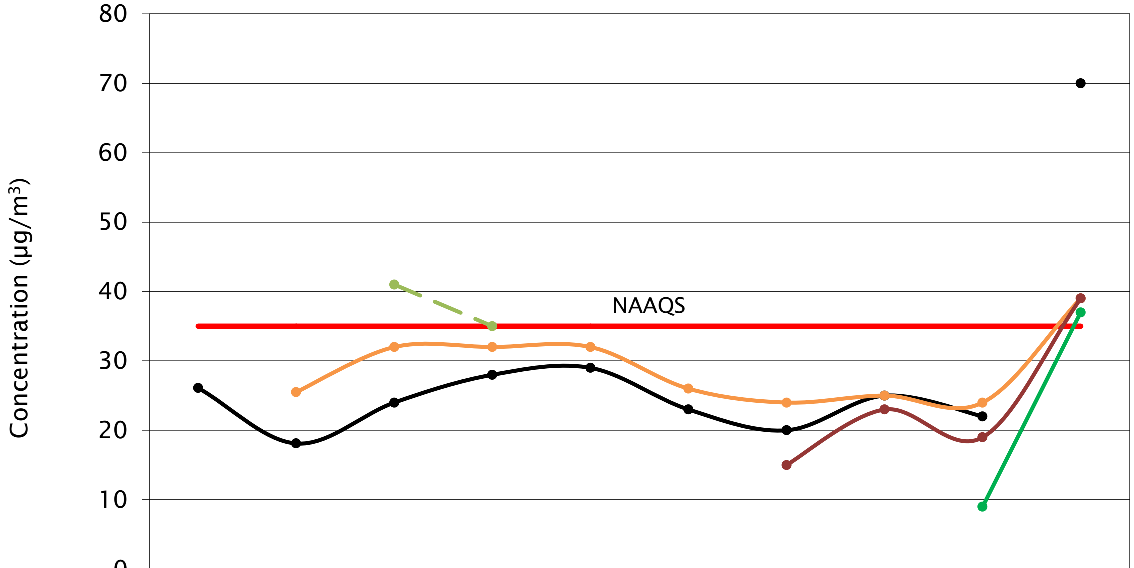
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAAQS	0.075	0.075	0.075	0.075	0.070	0.070	0.070	0.070	0.070	0.070
INC (2002)	0.061	0.062	0.062	0.063	0.062	0.062	0.063	0.065	0.064	0.069
LEM (2009)	0.066	0.068	0.067	0.067	0.068	0.069	0.070	0.071	0.069	0.072
RNO (0016)	0.064	0.067	0.067	0.070	0.070	0.070	0.069	0.071	0.070	
REN (0031)										0.073
SPK (1005)	0.066	0.068	0.068	0.068	0.068	0.069	0.069	0.071	0.069	0.070
SPS (1007)							0.068	0.069	0.065	0.062
SRN (0020)	0.065	0.068	0.068	0.069	0.068	0.068	0.068	0.069	0.067	0.067
TOL (0025)	0.066	0.066	0.066	0.067	0.068	0.067	0.067	0.068	0.067	0.066

$PM_{2.5}$ (24-hour) Design Values

NAAQS Level: 35 µg/m³
Design Value (2018-20): 39 µg/m³ (SPK)
Current Designation: Attainment/Unclassifiable (Entire County)

2020 Exceedances: 22
2020 First High: 189.7 µg/m³ (Sep 13 - SPS)
2020 98th Percentile: 74.7 µg/m³ (Aug 22 - SPS)

Figure 15
$PM_{2.5}$ (24-hour) Design Values



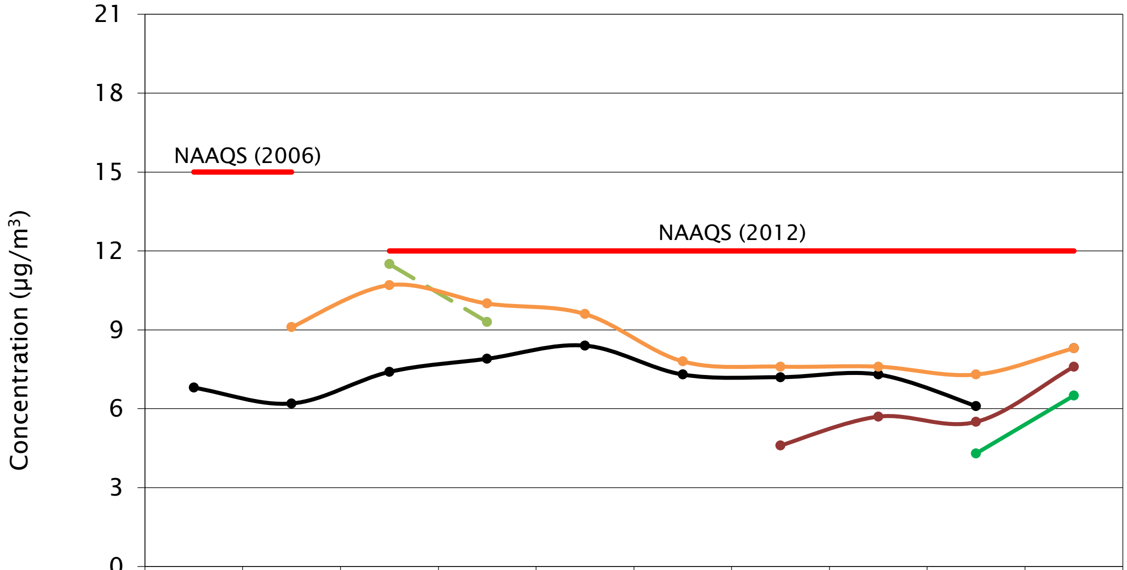
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAAQS	35	35	35	35	35	35	35	35	35	35
GAL (0022)			41	35						
RNO (0016)	26	18	24	28	29	23	20	25	22	
REN (0031)										70
SPK (1005)		26	32	32	32	26	24	25	24	39
SPS (1007)							15	23	19	39
TOL (0025)									9	37

$PM_{2.5}$ (Annual) Design Values

NAAQS Level: 12.0 µg/m³
Design Value (2018-20): 8.3 µg/m³ (SPK)
Current Designation: Attainment/Unclassifiable (Entire County)

2020 Annual Weighted Mean: 11.1 µg/m³ (SPK)

Figure 16
$PM_{2.5}$ (Annual) Design Values



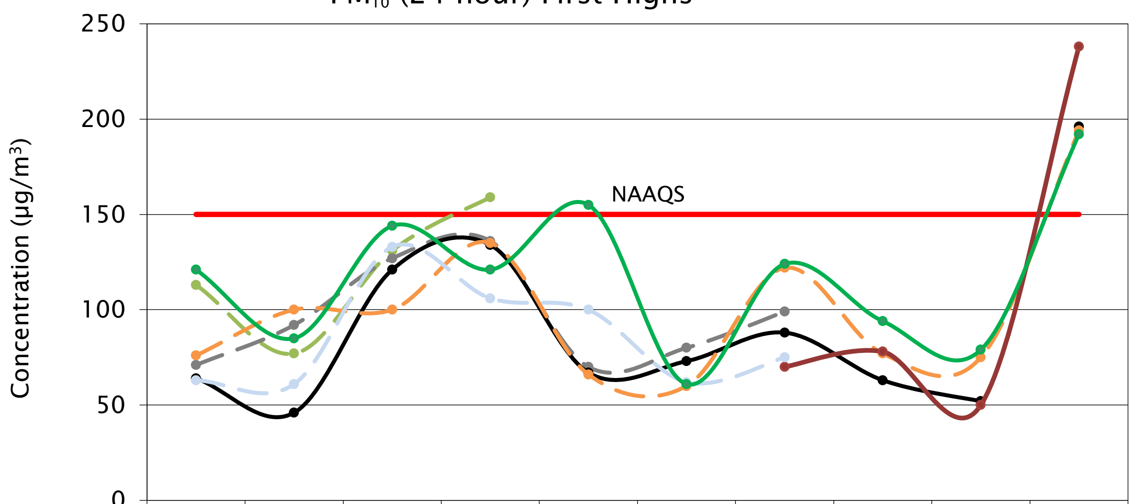
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAAQS	15.0	15.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
GAL (0022)			11.5	9.3						
RNO (0016)	6.8	6.2	7.4	7.9	8.4	7.3	7.2	7.3	6.1	
REN (0031)										8.3
SPK (1005)		9.1	10.7	10.0	9.6	7.8	7.6	7.6	7.3	8.3
SPS (1007)							4.6	5.7	5.5	7.6
TOL (0025)									4.3	6.5

PM_{10} (24-hour) First Highs

<u>NAAQS Level</u>: 150 µg/m³
<u>Design Value (2018-20)</u>: 1.7 expected exceedances (SPS)
<u>Current Designation</u>: Attainment (HA 87); Attainment/Unclassifiable (Remainder of County)

<u>2020 Exceedances</u>: 6
<u>2020 Expected Exceedances</u>: 1.7
<u>2020 First High</u>: 238 µg/m³ (Sep 13 - SPS)

Figure 17
PM_{10} (24-hour) First Highs



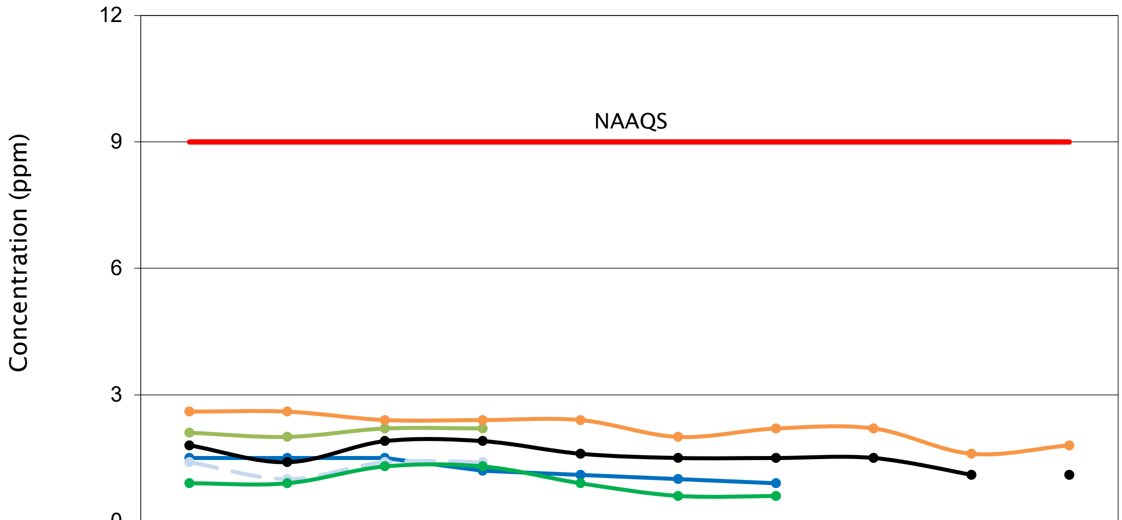
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAAQS	150	150	150	150	150	150	150	150	150	150
GAL (0022)	113	77	131	159						
PLM (0030)	71	92	127	136	70	80	99			
RNO (0016)	64	46	121	134	67	73	88	63	52	
REN (0031)										196
SPK (1005)	76	100	100	135	66	60	122	77	75	194
SPS (1007)							70	78	50	238
SRN (0020)	63	61	133	106	100	62	75			
TOL (0025)	121	85	144	121	155	61	124	94	79	192

CO (8-hour) Design Values

NAAQS Level: 9 ppm
Design Value (2019-20): 1.8 ppm (SPK)
Current Designation: Attainment (HA 87); Attainment/Unclassifiable (Remainder of County)

2020 Exceedances: 0
2020 First High: 2.1 ppm (Sep 13 - SPK)
2020 Second High: 1.8 ppm (Sep 12 - SPK)

Figure 18
CO (8-hour) Design Values



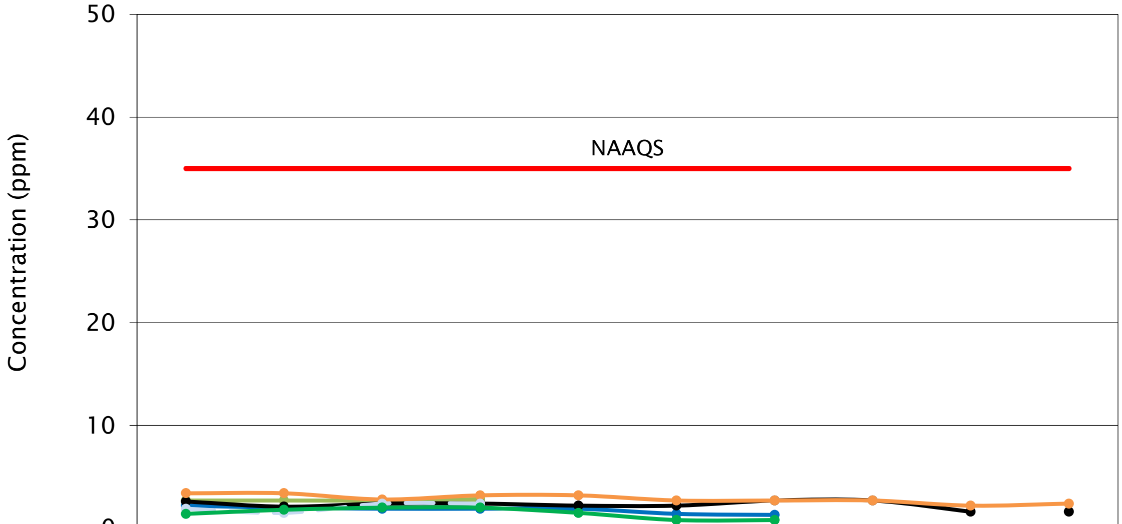
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAAQS	9	9	9	9	9	9	9	9	9	9
GAL (0022)	2.1	2.0	2.2	2.2						
LEM (2009)	1.5	1.5	1.5	1.2	1.1	1.0	0.9			
RNO (0016)	1.8	1.4	1.9	1.9	1.6	1.5	1.5	1.5	1.1	
REN (0031)										1.1
SPK (1005)	2.6	2.6	2.4	2.4	2.4	2.0	2.2	2.2	1.6	1.8
SRN (0020)	1.4	1.0	1.4	1.4						
TOL (0025)	0.9	0.9	1.3	1.3	0.9	0.6	0.6			

CO (1-hour) Design Values

NAAQS Level: 35 ppm
Design Value (2019-20): 2.4 ppm (SPK)
Current Designation: Attainment/Unclassifiable (Entire County)

2020 Exceedances: 0
2020 First High: 2.5 ppm (Sep 13 - SPK)
2020 Second High: 2.4 ppm (Dec 21 - SPK)

Figure 19
CO (1-hour) Design Values



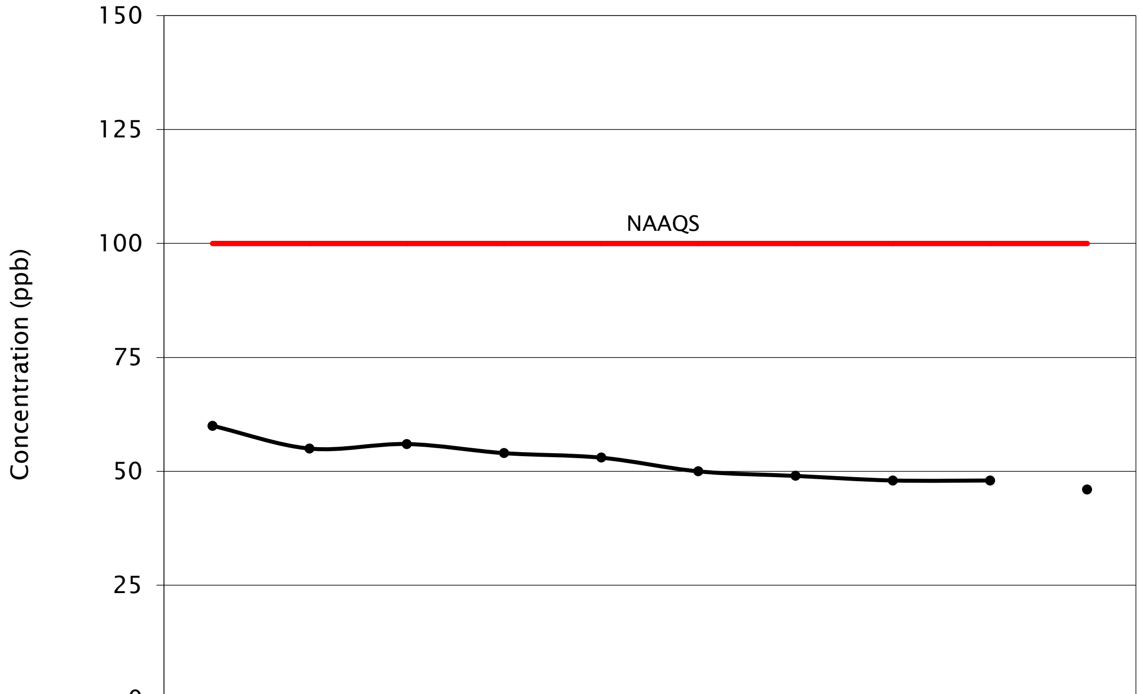
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAAQS	35	35	35	35	35	35	35	35	35	35
GAL (0022)	2.7	2.7	2.7	2.8						
LEM (2009)	2.2	2.0	1.9	1.9	1.9	1.4	1.3			
RNO (0016)	2.6	2.1	2.4	2.4	2.2	2.2	2.7	2.7	1.6	
REN (0031)										1.6
SPK (1005)	3.4	3.4	2.8	3.2	3.2	2.7	2.7	2.7	2.2	2.4
SRN (0020)	1.9	1.5	2.4	2.4						
TOL (0025)	1.4	1.8	2.0	2.0	1.5	0.8	0.8			

NO_2 (1-hour) Design Values

NAAQS Level: 100 ppb
Design Value (2018-20): n/a
Current Designation: Attainment/Unclassifiable (Entire County)

2020 Exceedances: 0
2020 First High: 55.1 (Jan 07 - REN)
2020 98th Percentile: 46.4 ppb (Feb 07 - REN)

Figure 20
NO_2 (1-hour) Design Values



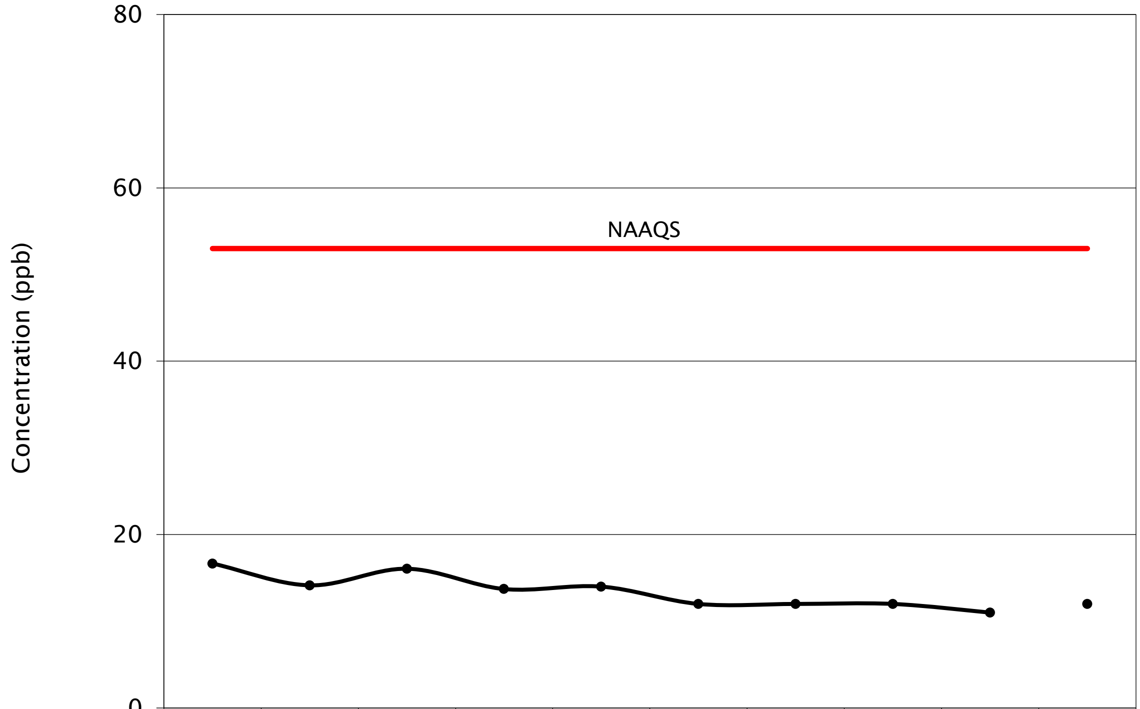
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAAQS	100	100	100	100	100	100	100	100	100	100
RNO (0016)	60	55	56	54	53	50	49	48	48	
REN (0031)										46

NO_2 (Annual) Design Values

NAAQS Level: 53 ppb
Design Value (2020): 12 ppb (REN)
Current Designation: Attainment/Unclassifiable (Entire County)

2020 Annual Mean: 11.6 ppb (REN)

Figure 21
NO_2 (Annual) Design Values



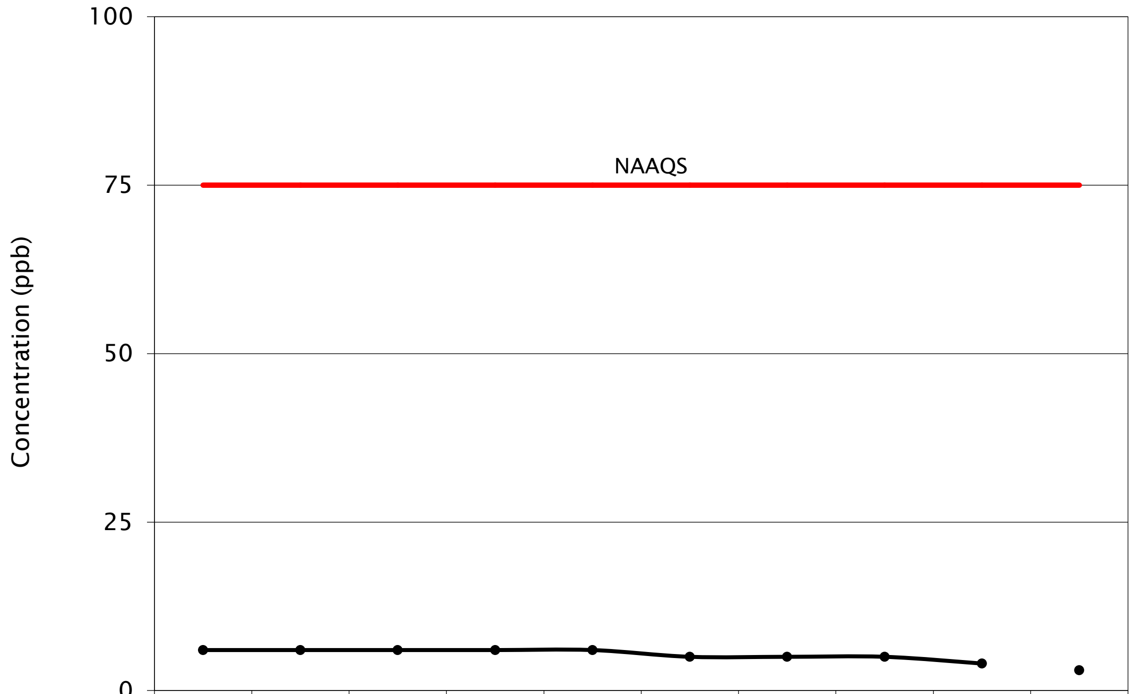
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAAQS	53	53	53	53	53	53	53	53	53	53
RNO (0016)	17	14	16	14	14	12	12	12	11	
REN (0031)										12

SO_2 (1-hour) Design Values

NAAQS Level: 75 ppb
Design Value (2018-20): n/a
Current Designations: Attainment/Unclassifiable (Entire County)

2020 First High: 5.4 ppb (Oct 31 - REN)
2020 99th Percentile: 3.3 ppb (Feb 14 - REN)

Figure 22
SO_2 (1-hour) Design Values



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NAAQS	75	75	75	75	75	75	75	75	75	75
RNO (0016)	6	6	6	6	6	5	5	5	4	
REN (0031)										3

Appendix A

Detailed Summary of Ambient Air Monitoring Data

Exceedances highlighted in Yellow

Violations highlighted in Red

NAAQS Exceedances (2018 - 2020)

Pollutant	Averaging Period	Exceedance Dates		
		2018	2019	2020
O_3	8-hour	Jun 11; Jul 17, 20, 27-31; Aug 1, 3, 6-11, 24, 25	None	Aug 20-25, 30; Sep 14-17
$PM_{2.5}$	24-hour	Jul 29-31; Aug 4, 6, 8-9	None	Aug 16, 19-23, 25, 27-30; Sep 3, 7, 11-17, 30; Oct 1
PM_{10}	24-hour	None	None	Sep 8, 11-13, 15-16
CO	1-hour	None	None	None
CO	8-hour	None	None	None
NO_2	1-hour	None	None	None
SO_2	1-hour	None	None	None
Pb	Rolling 3-month	n/a - Pb was not monitored		

Ozone (O_3)

8-Hour Ozone Averages (ppm)
(2020)

Rank	INC (2002)		LEM (2009)		REN (0031)		SRN (0020)		SPK (1005)		SPS (1007)		TOL (0025)	
	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date
1	0.085	09/15	0.084	08/22	0.075	08/22	0.069	08/20	0.074	08/21	0.070	08/21	0.068	08/19
2	0.083	09/16	0.082	08/21	0.074	08/21	0.067	08/22	0.073	08/23	0.063	08/20	0.067	08/20
3	0.081	08/21	0.080	09/17	0.073	08/20	0.066	08/18	0.072	08/20	0.062	09/17	0.067	09/17
4	0.078	09/17	0.079	09/15	0.073	08/23	0.066	08/21	0.072	08/22	0.061	08/18	0.066	08/02
5	0.077	08/22	0.076	08/23	0.073	08/24	0.066	08/23	0.072	08/24	0.061	08/23	0.066	08/22
6	0.075	08/23	0.071	09/14	0.073	09/17	0.065	08/25	0.070	09/17	0.060	08/22	0.066	08/23
7	0.074	08/20	0.070	09/16	0.071	08/25	0.064	08/19	0.069	08/02	0.060	08/24	0.066	09/15
8	0.072	08/24	0.069	08/24	0.070	08/18	0.064	08/24	0.069	08/18	0.060	08/25	0.065	05/10
9	0.072	08/30	0.069	08/25	0.069	09/03	0.063	09/17	0.069	08/25	0.059	08/02	0.065	08/21
10	0.070	05/10	0.069	08/29	0.068	08/02	0.062	08/30	0.067	05/10	0.059	08/19	0.064	09/11

4th High 8-Hour Ozone Averages (2018-2020)
and Design Values (ppm)

Year	INC (2002)		LEM (2009)		RNO (0016)		REN (0031)		SRN (0020)		SPK (1005)		SPS (1007)		TOL (0025)	
	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date
2018	0.070	08/26	0.077	07/27	0.078	07/31	n/a	n/a	0.075	07/31	0.076	07/28	0.070	08/09	0.072	07/31
2019	0.060	06/24	0.061	06/18	0.066	06/18	n/a	n/a	0.060	06/18	0.063	08/04	0.057	05/03	0.061	09/15
2020	0.078	09/17	0.079	09/15	n/a	n/a	0.073	08/23	0.066	08/21	0.072	08/22	0.061	08/18	0.066	08/02
DV*	0.069		0.072		n/a		n/a		0.067		0.070		0.062		0.066	

* Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years.

$PM_{2.5}$

24-Hour $PM_{2.5}$ Averages ($\mu g/m^3$)
(2020)

Rank	REN (0031)		SPK (1005)		SPS (1007)		TOL (0025)	
	Value (%ile)	Date	Value (%ile)	Date	Value (%ile)	Date	Value (%ile)	Date
1	94.1	09/15	124.6	09/13	189.7	09/13	104.3	09/15
2	92.0	09/13	118.6	08/12	161.6	09/12	101.8	09/16
3	87.4	09/16	100.2	09/15	107.5	09/15	98.1	09/17
4	78.0	08/21	83.9	09/16	101.7	09/11	80.9	09/13
5	77.2	09/17	83.1	09/17	89.7	09/16	80.7	08/20
6	76.2	09/12	71.5	09/11	87.5	09/17	67.9	09/14
7	69.7	09/30	75.2	08/22	76.9	08/21	66.7	09/30
8	69.6(98)	08/22	71.4(98)	09/30	74.7(98)	08/22	64.7(98)	08/19
9	66.0	08/19	66.8	08/21	70.3	09/30	62.4	08/22
10	65.3	08/20	64.8	08/23	69.6	09/14	60.8	09/11

98th Percentiles of 24-Hour $PM_{2.5}$ Averages (2018-2020)
and Design Values ($\mu g/m^3$)

Year	RNO (0016)	REN (0031)	SPK (1005)	SPS (1007)	TOL (0025)
2018	34.7	n/a	30.6	32.0	n/a
2019	11.0	n/a	15.8	10.6	9.3
2020	n/a	69.6	71.4	74.7	64.7
Design Value*	n/a	n/a	39	39	n/a

* 98th percentile, averaged over 3 years.

Annual $PM_{2.5}$ Means (2018-2020)
and Design Values ($\mu g/m^3$)

Year	RNO (0016)	REN (0031)	SPK (1005)	SPS (1007)	TOL (0025)
2018	8.0	n/a	7.9	6.8	n/a
2019	3.0	n/a	6.0	5.1	4.3
2020	n/a	8.3	11.1	10.9	8.7
Design Value*	n/a	n/a	8.3	7.6	n/a

* Annual mean, averaged over 3 years.

PM_{10}

24-Hour PM_{10} Averages (µg/m³) (2020)

Rank	REN (0031)		SPK (1005)		SPS (1007)		TOL (0025)	
	Value	Date	Value	Date	Value	Date	Value	Date
1	196	09/08	194	09/08	238	09/13	192	09/08
2	147	09/15	177	09/12	220	09/12	158	09/15
3	137	09/13	175	09/13	166	09/08	156	09/16
4	134	09/16	154	09/11	166	09/11	143	09/17
5	128	09/12	151	09/15	158	09/15	127	09/11
6	125	09/11	139	09/16	135	09/16	119	09/13
7	119	08/21	126	09/17	125	09/17	113	08/20
8	116	09/17	111	09/30	124	11/17	111	09/30
9	112	09/30	104	08/22	113	09/30	110	09/14
10	108	08/19	101	09/14	108	09/14	104	09/12

24-Hour PM_{10} Highs (µg/m³) (2018-2020)

Year	RNO (0016)		REN (0031)		SPK (1005)		SPS (1007)		TOL (0025)	
	Value	Value	Value	Date	Value	Date	Value	Date	Value	Date
2018	63	07/30	n/a	n/a	77	07/30	78	07/30	94	08/09
2019	52	11/14	n/a	n/a	75	11/13	50	06/02	79	08/26
2020	n/a	n/a	196	09/08	194	09/08	238	09/13	192	09/08

PM_{10} Expected Exceedances (2018-2020) and Design Values (expected exceedances)

Year	RNO (0016)	REN (0031)	SPK (1005)	SPS (1007)	TOL (0025)
2018	0	n/a	0	0	0
2019	0	n/a	0	0	0
2020	n/a	1	3	5	3
Design Value*	0	n/a	1.0	1.7	1.0

* Expected exceedances averaged over three years.

Carbon Monoxide (CO)

8-Hour CO Averages (ppm)
(2020)

Rank	REN (0031)		SPK (1005)	
	Value	Date	Value	Date
1	1.1	01/07	2.1	09/13
2	1.1	12/16	1.8	09/12
3	1.1	12/19	1.8	12/21
4	1.1	12/20	1.7	12/20

2nd High 8-Hour Averages (2019-2020)
and Design Values (ppm)

Year	RNO (0016)	REN (0031)	SPK (1005)
2019	1.0	n/a	1.5
2020	n/a	1.1	1.8
Design Value*	n/a	n/a	1.8

* Highest 2nd high 8-hour average in the last 2 years.

1-Hour CO Averages (ppm)
(2020)

Rank	REN (0031)		SPK (1005)	
	Value	Date	Value	Date
1	2.0	08/19	2.5	09/13
2	1.6	02/06	2.4	12/21
3	1.6	12/16	2.2	01/07
4	1.5	01/03	2.1	12/09

2nd High 1-Hour Averages (2018-2019)
and Design Values (ppm)

Year	RNO (0016)	REN (0031)	SPK (1005)
2018	1.6	n/a	2.0
2019	n/a	1.6	2.4
Design Value*	n/a	n/a	2.4

* Highest 2nd high 1-hour average in the last 2 years.

Nitrogen Dioxide (NO_2)

1-Hour NO_2 Averages (ppb)
(2020)

Rank	REN (0031)	
	Value (%ile)	Date
1	55.1	01/07
2	53.8	12/21
3	52.0	08/21
4	49.3	02/14
5	47.5	12/20
6	46.7	12/19
7	46.4 (98)	02/07
8	46.3	12/16
9	45.9	02/06
10	45.4	09/22

98th Percentiles of 1-Hour NO_2 Averages (2018-2020)
and Design Value (ppb)

Year	RNO (0016)	REN (0031)
2018	45.5	n/a
2019	45.6	n/a
2020	n/a	46.4
Design Value*	n/a	n/a

* 98th percentile, averaged over 3 years

NO_2 Annual Mean (2020)
and Design Value (ppb)

	REN (0031)
Annual Mean	11.6
Design Value*	12

* Annual Mean of all 1-hr averages.

Sulfur Dioxide (SO_2)

1-Hour SO_2 Averages (ppb)
(2020)

Rank	REN (0031)	
	Value (%ile)	Date
1	5.4	10/31
2	3.6	02/06
3	3.4	01/07
4	3.3(99)	02/14
5	3.0	02/07
6	3.0	12/30
7	2.9	08/19
8	2.9	12/19
9	2.8	01/10
10	2.7	12/09

99^{th} Percentiles of 1-Hour SO_2 Averages (2018-2020)
and Design Value (ppb)

Year	RNO (0016)	REN (0031)
	Value	Value
2018	4	n/a
2019	3	n/a
2020	n/a	3
Design Value*	n/a	n/a

* 99^{th} percentile of 1-hour daily maximum concentrations, averaged over 3 years.

Appendix B

Monitoring Stations in Operation from 1963 to 2020

Monitoring Stations in Operation (2011 – 2020)

AQS Site Name (AQS Site ID)	Ozone	$PM_{2.5}$	PM_{10}	TSP	HC	CO	NO_2	SO_2	Lead
Incline (32-031-2002)	93-20	99-02	99-02			99-02	99-02		
Lemmon Valley (32-031-2009)	87-20		87			87-16			
Reno3 (32-031-0016)	82-19	99-19	88-19	85-87		83-19	84-19	11-19	
Reno4 (32-031-0031)	20-20	20-20	20-20			20-20	20-20	20-20	
Plumb-Kit (32-031-0030)			06-17						
South Reno (32-031-0020)	88-20		11-17			88-14			
Sparks (32-031-1005)	79-20	12-20	88-20	85-87		80-20			
Galletti (32-031-0022)		13-14	88-14			88-14			
Toll (32-031-0025)	02-20	19-20	02-20			02-16			
Spanish Springs (32-031-1007)	17-20	17-20	17-20						

Monitoring Stations in Operation (1963 – 2010)

AQS Site Name (AQS Site ID)	Ozone	$PM_{2.5}$	PM_{10}	TSP	HC	CO	NO_2	SO_2	Lead
Health - Kirman (32-031-0001)				63-89					
Sparks - Greenbrae ES (32-031-0002)			85-90	68-90					
Reno - Cal-Neva (32-031-0003)				68-89					
Reno - Veterans ES (32-031-0004)				68-69					
Reno - Harrah's (32-031-0005)	76-82					72-81	72-85		
Reno - Jesse Beck ES (32-031-0006)				72-89					
Reno - Airport (32-031-0007)				72-89					
Reno - Fairgrounds (32-031-0008)				72-74					
Reno - Fish & Game (32-031-0009)				74-89					
Reno - Kings Row ES (32-031-0010)				77-89					
Reno - Stead (32-031-0011)				77					
Reno - Huffaker ES (32-031-0014)				80-89					
Reno - Center Street (32-031-0015)						82-85	82-90		
Sparks - Fire (32-031-1001)				68-69					
Verdi - ES (32-031-1002)				68-89					
Sparks - Nugget (32-031-1003)				72-80					
Sparks - TMWRF (32-031-1004)				74-89					
Sparks - Victorian (32-031-1006)			88	80-89					
Incline - Pump (32-031-2001)				72-89					
Wadsworth - Fire (32-031-2003)				73-75					
Empire - School (32-031-2005)				76-77					
Reno - Sun Valley (32-031-2006)			88-05	80-89					